

SDMS US EPA REGION V -1

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DOCUMENTS.**

(32) GENERAL INFO.

S. ECKHAUS

Report of Activities

OF THE
TECHNICAL DIVISION
DURING
WORLD WAR II

ARMY SERVICE FORCES
OFFICE OF THE CHIEF, CHEMICAL WARFARE SERVICE
WASHINGTON 25, D. C.

1 JANUARY 1946

c. CC#2 Manufacture. Plant No. 8 at Edgewood Arsenal, designed and built by the Plants Division, was also operated during 1940 and 1941 to produce approximately sixty thousand (60,000) pounds of CC#2 by the DPU process. This plant was turned over to the Production Division on 1 November 1941. Plants for producing CC#2 by the TCA process were designed by a research contractor. Production plants were built at Niagara Falls, New York; Midland, Michigan; and St. Louis, Missouri; for operation by the DuPont Company, the Dow Chemical Company, and the Monsanto Chemical Company respectively. A similar plant was built at Edgewood Arsenal and was operated by the Production Division. These plants produced all of the CC#2 required for protective clothing during the war.

d. Nitrogen Mustards. A process for producing HN-1, one of the nitrogen mustards, was developed in a pilot plant at Edgewood Arsenal. This plant supplied data for the design of a larger unit that was assembled in one of the M-1 plants at Pine Bluff Arsenal after production of M-1 was halted. The Pine Bluff Arsenal plant was operated for a period of about four (4) months and produced about one hundred (100) tons of HN-1. A small experimental plant was also designed and operated to produce a few hundred pounds of HN-3. No further development of this agent was carried out.

e. Incendiary Oil Fillings. Processes for preparing a number of thickened oils and for filling the many types of munitions in which these incendiary fuels were used, were developed through the pilot plant stage. These included a number of IM, NP and PT mixtures. In the case of IM and NP mixtures, the problem was to develop a method by which the fuel mixtures could be prepared and filled into the munitions before they became too viscous to be pumped through small lines. With PT, it was necessary to develop a filling method to handle a plastic semi-solid material. In all of these processes it was necessary to observe extreme safety precautions because of the inflammable and explosive properties of the mixture. The problems were successfully solved, and designs of production plants were prepared for erection at Chemical Warfare Service Arsenals and other production facilities. These included Napalm plants at Huntsville Arsenal and Pine Bluff Arsenal, and PT-1 plants at Rocky Mountain Arsenal and Marion, Ohio. These incendiary oil projects comprised a major part of plant design activities during 1943 and 1944.

f. PWP Process Development and Plant Design. PWP was originally developed by the NDRC, and a small experimental plant was operated under its control. Edgewood Arsenal was assigned the job of developing a suitable method of filling munitions with this new smoke producing material, and with determining the factors that affected the thermal stability of PWP. Several methods of filling were tried in a pilot plant before a satisfactory method was developed. A complete design for a semi-large scale plant was prepared and the plant was erected at Edgewood Arsenal. This plant was operated as a pilot plant for a period of five (5) months early in 1945 and was then turned over to the Production Division for use in filling Army and Navy production orders. Similar plants of larger capacity were designed for erection at Edgewood Arsenal and Pine Bluff Arsenal, but were not built due to the end of hostilities.

g. CG Process Development and Plant Design. The new and improved method of producing CG was developed and proved at Edgewood Arsenal. In this method, the reaction by the chlorine and carbon monoxide was carried out at a pressure of about 100 p.s.i., which reduced the size of the plant materially and produced a higher purity CG than the low pressure methods previously used. In the new method, the reaction was carried out in the annular space between two tubes which were filled with a granular catalyst and cooled by water in the jacketing and center tubes. Most of the refrigeration required in previously operated plants was eliminated by condensing the phosgene under pressure. The data obtained by the operation of the Edgewood Arsenal pilot plant was turned over to a research contractor and was used in designing the Duck River CG Plant. This production plant was operated for a short period before the end of the war. The CWS Development Laboratory at M.I.T. also developed, through the laboratory stage, a new method of making CG, using the jigging catalyst method in which the finely divided catalyst was suspended in the turbulent reacting gases at atmospheric pressure. There was no opportunity to develop this method further.

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Chart 100-100000-100-100-100

ACMHC Form 1-3 (Rev 5 May 59)

Contract Performance Report									
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Contract Title: 100-100000-100-100-100									
Contract Description: 100-100000-100-100-100									
Contract Location: 100-100000-100-100-100									
Contract Period: 100-100000-100-100-100									
Contract Status: 100-100000-100-100-100									
Contract Budget: 100-100000-100-100-100									
Contract Actuals: 100-100000-100-100-100									
Contract Summary: 100-100000-100-100-100									
Contract Details: 100-100000-100-100-100									
Contract Notes: 100-100000-100-100-100									
Contract Footer: 100-100000-100-100-100									

(Verbal agreement has been reached with the Bur 733, 400
the process of being signed. The only expense
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00029

6. SEARCH INFORMATION



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Research

FROM ITS BEGINNING, Monsanto realized that research was an essential part of the foundation supporting the chemical industry. Consequently research was made an integral part of the company's operation.

Monsanto research divides itself into specific programs. Continuous investigations are carried out to improve standards of purity, physical forms and better packaging.

Research is also directed toward the improvement of chemical manufacturing processes. The aim of such studies is to increase efficiency so that savings may be reflected wherever possible in the cost of Monsanto chemicals.

A third direction of Monsanto research is toward the wider application of its products. Such studies review the processes used in hundreds of industries and experiments determine how such processes may be simplified or how finished product quality can be improved through the proper use of chemicals.



Technical Counsel & Service

MONSANTO'S RESEARCH also concerns itself with technical problems of customers. These may range from working out standard chemical applications or may involve preparing chemicals to do a specific job for some industry which can be served by no commercial chemical or mixture of chemicals on the market. Problems of this type are as varied as a cross section of industry.

To serve plastics molders, a technical council studies questions of strength, moldability, speed of operation—any phase of plastics manufacturing, and returns a complete report with recommendations to the customer. Monsanto's Rubber Service Department is a complete facility for assistance to the rubber industry.

In the field of organics, technical service is available on problems of fortifying lubricating oil with suitable additives and the problems of plasticizing films and surface coatings.

Customers may receive advice on wood preserva-

try is the vigorous search for new products. Research produced a high-impact strength and abrasion-resistant, rag-filled melamine molding compound, fire-retarding agents for paper and textiles, and new compounds for processing natural and synthetic rubber. Still other chemicals have been developed for pharmaceutical manufacture, the paper industry, for petroleum processing, and for textile finishing. Much of this exploratory research is conducted by a Central Research organization. Here, specialized research—both laboratory and applied—is carried on, investigating new products and processes with applications in scores of industries. Product application problems are worked out in laboratories located in each division, sometimes in cooperation with Central Research.

Monsanto chemists, physicists, biologists and engineers of all types apply their specialized experience and training to exploratory work in developing the new products and the more efficient processes which will be a vital part of industry's future.



tion, insecticide and herbicide formulation and problems of organic synthesis.

Monsanto technicians study problems of formulation and manufacture of detergents and soap builders. Special laboratories work on textile problems that include shrink and crush resistance, water repellency and wool fiber control. Technical assistance is available to manufacturers of hot or cold press plywood.

Frequently manufacturers who are attempting to improve quality or who wish to build some special property in their existing products call upon Monsanto for study and recommendation.

Although the greater part of the technical counsel and service is called for by established customers who request help on specific problems—this service is also available to industries in search of special compounds for processing or finishing.

Technical counsel and service to customers is an integral part of Monsanto's operation. It is available to all of the industries who use chemicals in their processing or could use them to obtain higher quality or more versatile products.





Trade-marks . . .

THE FOLLOWING LIST contains the major trade-marks owned by Monsanto, arranged alphabetically. The trade-marks are enclosed by quotation marks and the generic name of the product follows. For some products, grade designations follow the trade-mark outside of the quotation marks.

Whenever trade-marked products are referred to in correspondence, articles, advertising copy, news releases or sales promotion material—this same method of designation should be followed.

When copy is being prepared for publication, the generic or common name of the product as shown in the following list should appear as often as possible linked with the trade-mark. The generic name should be used at least once on every page where the trade-mark appears. This will assure close association and make the trade-mark signify a brand name for the product's generic name.

In addition to the following list, Monsanto owns the trade-mark "Monsanto," the block "M" design mark and the slogan, "Serving Industry . . . Which Serves Mankind."

Trade-marks which are registered in the U. S. Patent Office are marked with an asterisk (*). Registered trade-marks must be identified when they appear in print. This can be done either by the statement that they are registered marks; by use of an asterisk after the trade-mark referring to the abbreviated notice, "Reg. U. S. Pat. Off." as a foot-

note or the letter R enclosed within a circle, thus ®, following the mark. The abbreviated notice may also be used in direct association with the trade-mark.

Trade-marks are an important investment. By using them properly, Monsanto can protect its carefully built-up interests in trade-marks.

- "A-1" Rubber Accelerator
- "A-10" Rubber Accelerator
- "A-19"* Rubber Accelerator
- "A-32" Rubber Accelerator
- "A-77"* Rubber Accelerator
- "A-100" Rubber Accelerator
- "Areskap"* Sodium Butyl-o-Phenylphenolsulfonate
- "Aresket"* Sodium Butylbiphenylsulfonate
- "Aresklene"* Disodium Dibutyl-o-Phenylphenoldisulfonate
- "Aroclor"* Polychlorinated Polyphenyls
- "Benthal"* Alkyd Resin Intermediate
- "Butasan"* Rubber Accelerator
- "Cerex"* Styrene Copolymer Plastic
- "Coumarin Monsanto"
- "Cresantol" 3 Germicide
- "Cresantol" 15 Germicide
- "Crysalba"* Dentifrice Base
- "D.P. Solution"* Lacquer Additive
- "El-Sixty"* Rubber Accelerator
- "Ethasan"* Rubber Accelerator
- "Ethavan"* Flavoring and Aromatic
- "Ethyl Thiurad" Rubber Accelerator
- "Fibestos"* Cellulose-Acetate Sheets
- "Flectol"* H Rubber Antioxidant
- "Fungiseal"* Wood Preservative

Accelerator
Lactone

"HB-40" Partially Hydrogenated Terphenyl
 "Hibitite" Acid Inhibitor
 "Hibitite" L Acid Inhibitor
 "Hi-Gloss Rez" Wood Sealer and Primer
 "Insoluble Sulfur 60"
 "Lauxein" Casein Glue
 "Lauxein" Casein-Soybean Blend Glue
 "Lauxein" Soybean Glue
 "Lauxite" Melamine Resin Adhesive
 "Lauxite" Phenolic Resin Adhesives
 "Lauxite" Resorcinol Resin Adhesives
 "Lauxite" Urea Resin Adhesives
 "Lauxtex" Casein-Bound Interior Paint
 "Lauxtol" A, Wood Preservative
 "Lustrex" Polystyrene Molding Compounds and Industrial Resins
 "Merclor" Sodium Hypochlorite
 "Merlon" BR Textile Processing and Finishing Agent
 "Merlon" BRS Textile Processing and Finishing Agent
 "Merlon" KR-1, 2, 3, 4, 5 Textile Processing and Finishing Agents
 "Merlon" S Textile Processing and Finishing Agent
 "Merlon" SP Textile Processing and Finishing Agent
 "Mersize" CD-2 Paper Sizing Agent
 "Mersol" Proprietary Solvent Alcohol
 "Mertanol" Synthetic Tanning Agent
 "Mertax" Rubber Accelerator
 "Mertone" WB-2 Precoat for Paper
 "Methasan" Rubber Accelerator
 "Milmer" 1 Fungicide
 "Mono Thiurad" Rubber Accelerator
 "Monsanto Detergent MXP"
 "Monsanto Fire Retardant A"
 "Monsanto Fire Retardant B"
 "Monsanto Salt" Dye Intermediate
 "Montar" Synthetic Resins
 "Nealco" Antifreeze
 "Nifos" T Insecticide
 "Niran" Insecticide
 "Nitron" Cellulose-Nitrate Sheets
 "Perflectol" Rubber Antioxidant
 "Perflectol" X Rubber Antioxidant
 "Permasan" Pentachlorophenol Wood Preservative
 "Pip-Pip" Rubber Accelerator
 "R-2" Rubber Accelerator
 "RN-7" Rubber Accelerator
 Reinforced "Vuelite" Cellulose Acetate
 "Resimene" Melamine-Formaldehyde Industrial Resins and Molding Powders
 "Resinox" Phenol-Formaldehyde Industrial Resins
 "Resinox" Phenol-Formaldehyde Molding Compounds
 "Resloom" HP Melamine-Formaldehyde Textile Resins
 "Resloom" M-75 Melamine-Formaldehyde Textile Resins
 "Resloom" NC-50 Melamine-Formaldehyde Textile Resins
 "Retarder ASA"
 "Rez" Wood Sealer and Primer
 "Rezgard" A, Fire Retardant for Textiles
 "Rezgard" E Fire Retardant for Textiles
 "Rezite" Wood Sealer
 "Rubber Resin LM-4"
 "SA-326" ortho-Biphenyl Biguanide
 "Saflex" Laminating Plastic for Safety Glass
 "Santicizer" 3 Plasticizer
 "Santicizer" 8 Plasticizer
 "Santicizer" 9 Plasticizer
 "Santicizer" E-15 Plasticizer
 "Santicizer" B-16 Plasticizer
 "Santicizer" M-17 Plasticizer
 "Santicizer" 140 Plasticizer
 "Santicizer" 141 Plasticizer
 "Santicizer" 160 Plasticizer

"Santobane" DDT Insecticide
 "Santobrite" Sodium Pentachlorophenate, Technical
 "Santocel" Silica Aerogel for Industrial Applications
 "Santocel" Silica Aerogel for Thermal Insulation
 "Santochlor" para-Dichlorobenzene
 "Santocure" Rubber Accelerator
 "Santodex" Oil Additive
 "Santoflex" 35 Rubber Antioxidant
 "Santoflex" B Rubber Antioxidant
 "Santoflex" BX Rubber Antioxidant
 "Santolite" MHP Industrial Resin
 "Santolite" MS-80% Industrial Resin
 "Santolube" 31 Oil Additive
 "Santolube" 203-A Oil Additive
 "Santolube" 204 Oil Additive
 "Santolube" 205 Oil Additive
 "Santolube" 206 Oil Additive
 "Santolube" 222 Oil Additive
 "Santolube" 303-A Oil Additive
 "Santolube" 394-C Oil Additive
 "Santolube" 395 Oil Additive
 "Santolube" 395-X Oil Additive
 "Santolube" 398 Oil Additive
 "Santolube" 520 Oil Additive
 "Santolube" 520-X-1 Oil Additive
 "Santolube" 570-X-4 Oil Additive
 "Santomask" II Odor-Masking Agent
 "Santomer" Alkyl Aryl Sulfonates
 "Santomer" B Sodium Loralkyl Sulfobenzoate
 "Santophen" 1 Germicide
 "Santophen" 7 Germicide
 "Santophen" 20 Pentachlorophenol, Technical
 "Santopoid" 29 Oil Additive
 "Santopoid" S Oil Additive
 "Santopoid" S-RI Oil Additive
 "Santopour" Oil Additive
 "Santopour" B Oil Additive
 "Santosite" Sodium Sulfite Anhydrous, Technical
 "Santotan" KR Basic Chrome Sulfate
 "Santovar" A, Rubber Antioxidant
 "Santovar" O Rubber Antioxidant
 "Santowax" M, meta Terphenyl
 "Santowax" O, ortho-Terphenyl
 "Santowax" P, para-Terphenyl
 "Santowax" Regular, Mixed Isomeric Terphenyl
 "Santowhite" Rubber Antioxidant
 "Santowhite" MK Rubber Antioxidant
 "Santowhite" MKS Rubber Antioxidant
 "Skylac" Aircraft Finish
 "Sopanox" ortho-Tolyl Biguanide
 "Sopet" Fiber Lubricant
 "Sted" Textile Detergent
 "Sterox" CD Polyoxyethylene Ester
 "Sterox" SE Polyoxyethylene Thioether
 "Sterox" SK Polyoxyethylene Thioether
 "Sterox" No. 5 Polyoxyethylene Thioether
 "Sterox" No. 6 Polyoxyethylene Thioether
 "Strymer" S Textile Sizing Agent
 "Syton" W-20 Silica Sol
 "Thiofide" Rubber Accelerator
 "Thiotax" Rubber Accelerator
 "Thiurad" Rubber Accelerator
 "Ultron" Vinyl Plastics
 "Ultrosol" Vinyl Organosol Coating
 "Ureka" Rubber Accelerator
 "Ureka" Blend B Rubber Accelerator
 "Ureka" C Rubber Accelerator
 "Vanillin Monsanto"
 "Vello" Casein-Bound Wall Finish
 "Vuelite" Cellulose-Acetate Embossed Shield Material for Fluorescent Lighting
 "Vuepak" Rigid Transparent Packaging Material
 "White Rez" Wood Sealer and Primer

Who Monsanto Serves

MORE THAN 400 Monsanto products serve more than half a hundred different industries all over the world.

Industries which supply the three necessities of mankind—food, shelter, clothing—find Monsanto a dependable source for the chemicals needed between raw materials and finished articles of commerce.

In the field of agriculture, Monsanto supplies weed killers and insecticides; food processing is supplied with preservatives, flavors, condiments and baking powder phosphates; textile chemicals run the gamut from scouring agents, through dyeing, to finishes for imparting crush and shrink resistance.

Monsanto supplies basic chemical needs to the iron and steel industry, from ferrophosphorus for special steels to the melamine baking enamels for finishing stoves, automobiles, and refrigerators.

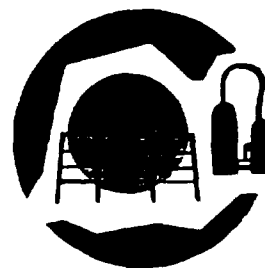
Monsanto organics are the intermediates for many pharmaceuticals, from common aspirin to sulfa drugs.

The plastics industry is supplied with resins and molding powders. Monsanto plastics include both thermosetting and thermoplastic types. Special formulations are made for paper and fabric coating and also for extruding, laminating and calendering.

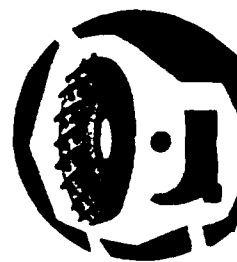
Exterior and interior plywood panels, as well as fine furniture, owe the strength of their glue bonds to Monsanto adhesives. Tires and rubber articles, from stair treads to hot water bottles, are processed with rubber chemicals found in Monsanto's product list.

The fifty-odd industries which use Monsanto products, represent a cross section of international business. Products from these industries are so many and so diverse that every hour of his life the average person uses something that owes at least part of its manufacture to a Monsanto chemical.

The pages immediately following list many of the major industries served by Monsanto and the principal products supplied to each, with page numbers on which full data may be found.



CHEMICAL



RUBBER



PAPER



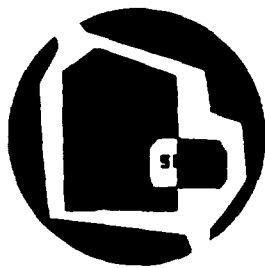
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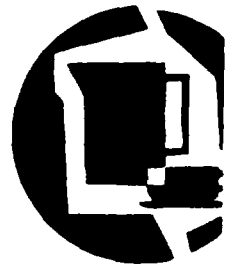
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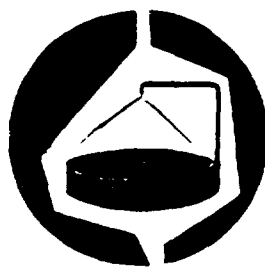
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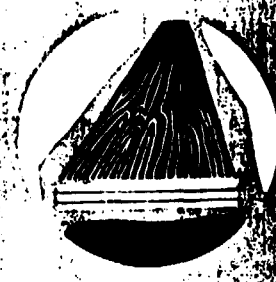
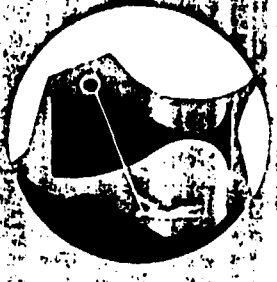
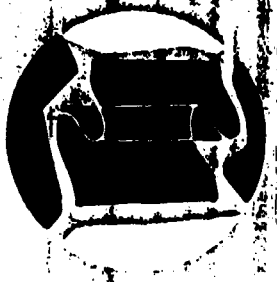
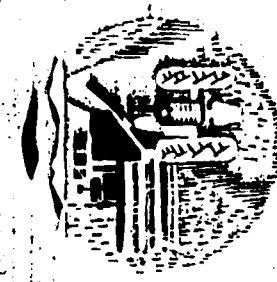
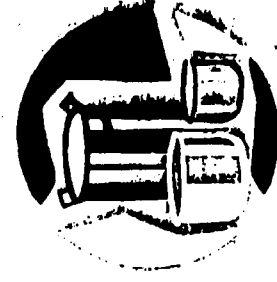
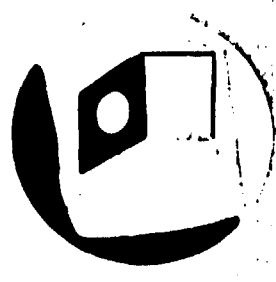
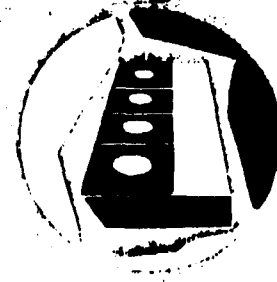
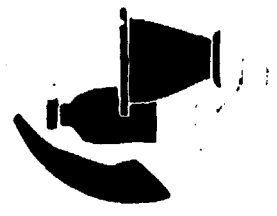
SOAP



CERAMICS



PRINT



FILE SOURCE

St. Louis CWS Plant, Monsanto, Ill., 6 Jan 43, sub: Reported Organization of Guards. (also 1st, 2d, & 3d Inds. thereto).

CWS 231 - Chicago CWPB - 1943.

NOTE TAKER

LB/hmb

COMMENTS

"1. It has been reported an attempt is being made to organize the guards of your facility and those of Monsanto Plants "A" and "B".

2. In that we may be of assistance, please report names of Unions which organizers represent, relationship between those unions and Plant operating Unions if possible, names of organizers and Union officials, degree of intensity of organizing campaign, attitude of guards toward accepting membership, and other pertinent information of interest.

3. Copies of enclosed Cir. 62 are being forwarded for your information, having previously been made available to you and the management of the Monsanto Facilities.

For the Commanding Officer:

(signed).

1st Ind.

St. Louis Plant, Chemical Warfare Service, Monsanto (East St. Louis), Illinois. January 9, 1943. To: Chief, Plant Protection Division, Chicago CW Procurement District, 1600 Civic Opera Bldg., Chicago, Ill.

1. It is reported to me that Mr. Fred Olds, one of the American Federation of Labor organizers, held a meeting in East St. Louis, Illinois, last Sunday for the purpose of explaining a new plant guard labor union to the plant protection guards in this vicinity. The meager report to date indicates that this meeting was not too ~~well~~ successful. There have been no reports that any of the Monsanto Plant "B" or CWS guards are interested in joining such an organization. As you undoubtedly know, the CWS guards are excluded from membership in the Chemical Workers Local No. 20032. On the other hand, it is known that the CWS guards are the only guards in this area who are not organized. You will be informed of any serious attempts to organize the guards, as soon as such evidence comes to light.

F. R. JOHNSON,
Lt. Col., CWS,
Commanding.

TO: Elliott Morrill, Major, CWS ✓

HEADQUARTERS
Chicago Chemical Warfare
Procurement District

Date: July 20, 1942

SUBJECT:

1st. Ind.

④3 GENERAL
INFO.

1. In regard to question in par. 2 of basic communication, the undersigned does not approve of the fiber containers for the shipment of CC-2 compound for either interstate or export shipments. There can be no question of the difference in strength between the fiber containers and the tight wooden barrels, and when we consider the cost of the commodity, the strength of the container should certainly be considered. The difference in the price of the containers is approximately 50% -- fiber drums costing approximately \$1.00 - the wooden barrels with suitable liners, \$1.50. Furthermore, the barrel can be used for both interstate and export shipments, whereas the fiber drum can not be used for export shipments as such, but will have to be crated -- increasing the cost of the container roughly 150% to 200%.

2. In discussing this matter with Major Finley of the Monsanto Plant, that officer fully agreed with the undersigned as to the desirability of the container over the fiber drum. That officer suggested a liner known as the "Hallowax" liner. He stated that it would not be necessary to change any of his loading facilities should the container type be changed.

3. This officer can give no definite manufacturing date on the wooden barrel, but has been told by manufacturers, they can be made at the rate of about 3000 per day.

4. Although the wooden barrel has been suggested as a container for this material, it must also be remembered that this material can be packed in wooden boxes. These boxes would necessarily have to contain suitable liners - possibly the material itself could be placed in paper bags inside the container box.

5. It was also suggested that a glass lined steel barrel be used. This container would be excellent if it were not for the damage of chipping the inner surface of the barrel and exposing the bare metal. Should this occur, the container would be rendered useless.

Howard D. McDonald
Howard D. McDonald
Captain, C. W. S.

HDM:bc

Left Van Wyk. For your comments & return.

(50) GENERAL
MONSANTO INFO

The Story of Monsanto

Faith, Hope and \$5,000

THE TRIALS AND TRIUMPHS
OF THE FIRST 75 YEARS

by Dan J. Forrestal



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CHAPTER VI

World War II and Its Aftermath

A new organization plan established by the company in 1939 was sound—and was destined to stay rather firmly in place until January 1, 1954, when a more sophisticated, though not necessarily more lasting, concept would be introduced.

During this 15-year interim, two new operating divisions would be added (Western and Texas)—bringing the total to six. Also, there would be adjustments to the nomenclature and alignment of general staff departments. Yet, by and large, the basic "divisional arrangement" determined at the dawn of World War II long served as the foundation of a rather decentralized superstructure.

In the sixties Monsanto would carry the format to the point where there would be as many as nine divisions and thirteen corporate staff departments. But the record shows that important and hard homework for organizational efficiency started in 1939.

Even though the British-based Monsanto Chemicals Limited was designated an "operating division" in the 1939 organizational plan, largely as an interim convenience, the fact remained that domestic Monsanto became divided into four major profit centers: the Organic Chemicals Division, the Phosphate Division (later to be renamed Inorganic), the Merrimac Division and the Plastics Division.

The motivation was to divide Monsanto into manageable segments and to delegate authority and responsibility as far downward as was deemed realistically possible, thus making each divisional general manager accountable for his share of the company's substantial investments.

Even in 1939 and 1940 there was good-natured joshing about the "maharajas" who would rule the divisional roosts—two in St. Louis and one each at Everett and Springfield, Massachusetts. The "little kings" were forerunners of a larger hierarchy of division general managers and, later, operating company managing directors who would have something approaching—approaching but not quite reaching—autonomy in their line responsibilities.

As the company moved into the forties, to be tested severely by the

war years and by a shattering tragedy at Texas City, Texas, Edgar Queeny served in two capacities, as presiding officer of the board of directors and as president of the company. Charles Belknap, who had been summoned hastily from Everett in 1935, when Queeny was kicked by a horse and permanently injured his right eye, served as executive vice president.

There was an Executive Committee assigned to long-range planning and matters of corporate policy. Administrative responsibilities were placed with the operating divisions, with support from corporate staff departments.

Monsanto was better prepared for the war years than it would have been had it not undertaken its organizational readjustments. The company had not only digested its new bites into new businesses in the late twenties and in the thirties, but it had worked with some intensity to integrate the new people, new plants and new product lines into the total operation. Edgar Queeny was not the sole architect of the 1939 plan. All his senior officers were involved in putting it together. Queeny's appraisal: "It tidied us up."

The year 1940 had its special strains.

On the political front, Edgar Queeny was not the only businessman who believed President Franklin D. Roosevelt's two terms in office were a plentiful sufficiency.

Queeny became fascinated by Wendell L. Willkie, a colorful, semi-conservative (compared to FDR) dark horse for the Republican presidential nomination. Up to and during the national convention in Philadelphia, Queeny was an ardent Willkie supporter. But the infatuation was short-lived. Shortly after Willkie was nominated as the Republican standard-bearer, Queeny found several of Willkie's "One World" platforms unsuitable and he ducked out of the political arena faster than he had entered it.

Until Pearl Harbor Day, December 7, 1941, many Americans—perhaps responding to their hearts and hopes more than to reason—kept saying, "It's not our war." Even after Hitler moved into Czechoslovakia and Poland, there were Americans who insisted the war clouds over Europe would simply remain war clouds over Europe.

In the June, 1940, issue of *Monsanto Magazine* Queeny wrote: "If the United States is to produce all that is necessary with the greatest speed, every American must give both loyalty and cooperation."

A few months later, the realities were driven home when the officers and staff of Monsanto Chemicals Limited moved from London to a safer "temporary headquarters" in rural England. This relocation was only a hint of the drama and disruption that all of Monsanto—and much of the world—would shortly be facing.

The 1940 Annual Report stated: "Due to the uncertainties created by the conflict abroad and the exchange restrictions, we have eliminated

our British subsidiaries."

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Production-related milestones for the year included the establishment of a new synthetic nitric acid plant at Everett; a new Resinox plastic plant at Springfield; a fourth electric furnace for elemental phosphorus at Columbia, Tennessee; a new contact sulfuric acid plant at Monsanto, Illinois; and the start of construction of a plant at Trenton, Michigan, near Detroit, for the production of phosphate salts.

A non-production-related milestone ranked equally high, or perhaps higher, in lasting importance: In 1940, Monsanto shareowners approved a farsighted pension plan covering all employees.

But it was not a "business as usual" year.

Nor was 1941.

"American industry geared itself to full war production" was the way the 1941 Annual Report started. A subsequent paragraph read as follows: "Approximately \$8,500,000 was expended for improvements and extensions of plant facilities. All major expansion was in directions whereby we could be of more service in the preparedness program and for which we were granted Certificates of Necessity permitting amortization over a five-year period. Capacity was increased for production of phthalic anhydride, important raw material used in the manufacture of special paints for Army and Navy equipment. Production facilities were provided for an increased supply of plasticizers for synthetic resins and synthetic rubber. Broader use of sulfanilamide and related sulfathiazole intermediates and salicylic acid, aspirin and acetophenetidin caused us to increase production facilities of these important pharmaceuticals."

Other products identified were tetryl, "a high explosive," and oleum "for TNT."

Immediately after the Japanese bombed Pearl Harbor on December 7, Edgar Queeny ordered a dispatch to all Monsanto locations, calling on the company's total resources. He later confided to a friend, "We had the illusion that, somehow, we were ready. But there was a lot of catching up to do."

At the close of 1941 Monsanto had four major war plants under construction or on the drawing boards—two for the Chemical Warfare Service, one for the Army Ordnance Department, and one for the Rubber Reserve Company, a government agency.

The 1941 Annual Report used this language: "Shutting off of rubber imports and the subsequent demand for rapid increases in the manufacture of synthetic rubber brought Monsanto a request by the Rubber Reserve Company, a government agency, to design, construct and operate a plant to manufacture an important raw material for synthetic rubber. We have acquired a site . . . on which the plant, government financed, will be erected."

No mention of the product: styrene monomer.

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No mention of the location: Texas City, Texas.

Obviously and understandably, Monsanto felt under wraps. Security was a constant consideration in wartime.

Yet styrene monomer had been no secret product in prewar Monsanto. Dr. Charles A. Thomas and Dr. Carroll A. (Ted) Hochwalt, up at Dayton's Central Research Department, had been working since 1938 with styrene monomer, in conjunction with the research department of the Plastics Division at Springfield, Massachusetts. They had viewed styrene monomer as a raw material of great potential in plastics. They had even set up a small pilot plant using styrene for plastic compounds.

Styrene monomer thus was no newcomer to Monsanto. Yet in the 1941 Annual Report, with styrene monomer looming as the key to the government's all-out effort to mount a synthetic rubber program, prudence indicated that the words styrene monomer not even be mentioned. Instead, Monsanto confined its language to "an important raw material for synthetic rubber." A new day of restricted disclosure had dawned.

The same Edgar Queeny who in the early thirties was eager to provide shareowners with more detailed information now found himself in a corner, confined by the constraints of national security. Indeed, he knew the Germans had developed their own synthetic rubber, buna-S. He knew the Germans and Japanese were aware that "an important raw material for synthetic rubber" was inevitably and inescapably styrene monomer. Yet he chose not to identify the end-product in his report to shareowners.

Several people who worked closely with Edgar Queeny at that time express the belief that it was difficult for "Mr. Monsanto" to restrain his enthusiasm—for he very well knew that America rolled on rubber, that the war would roll on rubber, and that Monsanto styrene would become a crucial necessity of the wartime synthetic rubber program.

Governmental restriction piled on governmental restriction the following year.

Monsanto's 1942 Annual Report faced a new inhibition head-on, as follows: "It is with regret that we abandon our past practice of transmitting to our shareowners an informative and interpretive Annual Report on our operations. Two causes dictate this course. The necessity of secrecy imposed by our national interest surrounds much of the activities upon which the company has been engaged. The other cause—to which we yield with reluctance—is the result of new proxy provisions prescribed by the Securities and Exchange Commission. We have been advised that these new rules make an annual report a part of proxy soliciting material. Therefore, they may have the result of imposing severe liabilities upon the directors and officers of the company in the event of misstatement or omission of material fact. Honest expressions or interpretation of operations or prospects by company officials might,



*The Monsanto
World War I*

in the light of subsequent events, prove incorrect. . . . Company officials cannot be infallible."

The message added: "Until the import of these new regulations is established or clarified . . . no prudent course seems open other than limiting Annual Reports to terse statements of fact, verified at the time by independent auditors."

In the guarded era which followed, Monsanto Annual Reports, heretofore brimming with information to help shareowners understand the full and open facts of their company, became sparse, digital and—to quote Edgar Queeny—"dull."

Interim reports were a bit more open. Comments at Annual Meetings were much more open. And *Monsanto Magazine* all of a sudden began to contain more stories of substance regarding the operations of the company. Queeny wryly observed, "No penalty is as yet attached to human errors that may appear in company publications." He added, "Our magazine is our forum; let's use it to the fullest."

When he was asked how he felt about the new SEC regulations and the handcuffs they imposed on Monsanto and other public companies, Queeny chose one honest word: "bitter."

A close associate said, "Edgar felt the medicine was worse than the disease. He had no reservations at all when it came to prudence in national security. When in doubt, he chose not to divulge information which might be sensitive. But he regarded the SEC regulations as more unnecessary Big Brotherism from Washington, impeding a corporation's obligation to disclose material information to its owners. He was already sufficiently opposed to government interference. The SEC handcuffs made him even more obstinate."

Most businessmen who had observed Queeny as an opponent of the New Deal and as an insurgent in the wake of newly imposed SEC policies were inclined to understand—because the shoe that pinched Queeny also pinched them. However, there were also a few who misinterpreted Queeny's motives and who said, in the light of the era of patriotism of 1942, that Queeny had gone a bit too far at a time when all Americans should be standing together.

The 1942 Annual Report of Monsanto ended with these words: "The Monsanto organization gave to the nation its best in a difficult year. Faced with dislocation and losses of markets, interruptions in the flow of raw materials, staffing and bringing new plants into operation, and the meeting of production requirements with many of our personnel in the armed services, Monsanto men and women gave to the fullest of their ability. The Army-Navy 'E' flies over the executive offices and five of our plants. . . . Ninety-eight percent of our personnel have subscribed for war bonds."

Francis J. Curtis, a sensitive and articulate chemical engineer who had come into Monsanto via Merrimac, sensed the strain besetting

Queeny, Gaston F.

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Union (AFL).



Edgar Queeny in 1942. He remarked, "Above all, Edgar was an American. I would call him a Fourth of July American. But few people knew this. And he was not about to hum 'The Stars and Stripes Forever.' His fervor for America and for Monsanto was so deep that he simply could not tolerate any Washington edicts which he thought were wrong. As a consequence, he was often in a position where he felt he had to speak out against the policies of the country he loved. I am sure he weighed the possibilities of his positions being misconstrued. But he had convictions—and he insisted they be aired."

And that was the uncomfortable position of Edgar Queeny and Monsanto in 1942.

This same Frank Curtis became a vice president the following year and stepped promptly into a singular niche in Monsanto history. A Harvard-trained scholar, Curtis had an influence—especially in the company's technical community—that far transcended the formal nature of his job. His official function was to serve as director of Monsanto's program of long-range development in the U.S. and abroad, including general research and sales development. This was an assignment he tackled with gusto, but it represented only a portion of his contribution to the company.

A bachelor and proud of it, Frank was a warm and jovial "Friar Tuck" who had an easy rapport with people. He became one of Monsanto's early champions of the role of chemical engineer. His pink cheeks would flush pinker when he heard people relegate the engineer to second-class status.

Many industrial chieftains use the tired old expression about their doors always being open—but Curtis didn't have to, for it was widely known that he was, in fact, available as father confessor to those in search of counsel, solace or encouragement.

In 1943 the biggest news on South Second Street's "Peacock Alley," or executive suite, was the elevation of Charles Belknap from executive vice president to president, Edgar Queeny having relinquished this latter post while continuing as chairman.

(In its 75-year history, Monsanto has used the executive vice president title rather sparingly, and Belknap was the first. In the late forties Charles A. Thomas had this title before moving along to the presidency. In the mid-fifties Robert R. Cole was given the title prior to his retirement, primarily as an expression of gratitude and respect. In 1959 Charles H. Sommer was elected executive vice president before taking over presidential responsibilities the following year. It was not until 1975-1976 that others—Edmond S. Bauer, H. Harold Bible, Louis Fernandez and James J. Kerley—were honored with this high title.)

There have been vice presidents and group vice presidents and senior vice presidents and regional vice presidents in the course of executive realignments, but that special designation executive vice president was particularly fitting for Charlie Belknap, Navy alumnus and Merrimac

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alumnus, who weathered many of the major storms of the period of acquisition and of the early days of World War II. Back in World War I he had been credited by a high government official as the man who brought shipping out of "chaos and confusion" to "organization and efficiency." His elevation from executive vice president to president met with widespread internal acclaim.

Edgar Queeny, in his continuing role as board chairman, may have inadvertently misled a few outsiders when he insisted on taking a cut in salary for relinquishing the presidential chair. Without offense to the leadership qualities of President Belknap, the overpowering reality was that Edgar Queeny's influence was not dramatically diminished by the 1943 change of command. Queeny was still Queeny, titles notwithstanding.

William F. Wendt, longtime handyman in the service department, had an appropriate comment about 1943, plus a little anecdote comparing Edgar Queeny with his father.

Wendt said, "I'll never forget the time in the early twenties when I went to a wholesale hardware house downtown to take advantage of a sale. One broom was forty cents and the second broom cost only twenty cents. When John F. Queeny saw the sixty-cent invoice he reprimanded me harshly and told me, 'This is a one-broom company and when I think it has become a two-broom company, Mr. Wendt, I will so inform you.' I felt chastised. There was no doubt about who was the boss in those days. Equally, there was no doubt about who was the boss even when Edgar Queeny vacated the job as president. It really didn't make any difference what you called him. You could have called him an office boy, but he still would have been Edgar Monsanto Queeny."

In 1943 there wasn't a Monsanto employee who didn't know what Bill Wendt knew. And, to be sure, Charlie Belknap knew—and he knew there was a lot of work to be done. He also knew his new credentials would enable him to exercise greater leadership responsibilities in concert with Queeny during an era that all in Monsanto found challenging and fatiguing.

So now Monsanto had a man known as "the skipper" on the bridge. He had a look of the sea about him. He was distinctive. He even had bushy eyebrows. And he had the honor of being the first import from another company (Merrimac) elected to occupy Monsanto's presidential chair. All prior top corporate officers had been affiliated with the parent company, which was now, in 1943, called the Organic Chemicals Division.

Perhaps Monsanto's proudest day of 1943 came on March 10, when the first tank car of styrene monomer left Texas City for Akron, Ohio, where in a Goodyear plant it was mixed with butadiene to become synthetic rubber for the first U.S. Army Jeep tire in history—styrene from a \$17-million plant designed and built by Monsanto, a plant that had come under construction March 17 of the previous year. Before

1943 ended, Monsanto received the Chemical Achievement Award for its round-the-clock scurrying to bring the government's first styrene plant on stream.

Sticking with colorful, tempestuous 1943 . . .

Sales were up over those for 1942, but earnings were down. Queeny commented, "In light of all we've tried to do, what an epitaph!"

The 1943 Annual Report was again eloquent with his feelings. It led off: "It is with regret that we again refrain from publishing an interpretive report of our operations. . . ."

It continued: "In view of prevailing criticisms of industrial earnings, it seems desirable to call attention to one statement of important fact obvious itself from the company's reported net income—*Monsanto Chemical Company is not profiting from this war!* On the contrary, 1943 net profit was less than that of 1942, which in turn was less than that of 1941. Earnings are less now than immediately preceding the war, although wartime sales are the greatest in our history. *Our operations are making no war millionaires.*"

In the same vein, Queeny went on to say, "Realizing the owners of Monsanto Chemical Company are entitled to a fuller report than management is willing to hazard under prevailing circumstances, its officers plan to review in detail the various phases of our company's operations at the forthcoming annual shareowners' meeting." This was part bite, part bark. Queeny was upset.

But he did add this in the Annual Report narrative: "In the past year, Monsanto gave its best to the nation. Approximately 1800 of our men and women have entered the armed services (out of 11,000). Despite this serious drain on our personnel, operations continued at a high rate. Monsanto's substantial contribution to the production of vital war materials is attested by 19 Army-Navy 'E' Awards for excellence in production."

Frank Curtis, sensitive to the things that make people react as people, was a friend who could "read" Edgar Queeny—one who could comprehend what he called "Edgar's mix of pragmatism and idealism." He commented, "This was an era when Edgar had a tug-of-war in his mind and heart. Somehow, he felt the chemical industry's obsession with serving the government during the time of war should have been recognized by a more responsive reaction from Washington lawmakers. The more Edgar pressed on, the more he felt he was being turned off. He didn't really care about glory or recognition. He had the old-fashioned notion that, at a time his country was fighting for freedoms, a few freedoms should be accorded to the business system which was helping the nation in war. He hated bureaucratic interference—and he was not about to be talked into hiding his feelings. Not everybody understood. And I know he knew this. But he would not be dissuaded. He had never figured life as a popularity contest, anyway."

By 1944 Monsanto-watchers had learned not to count on anything

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beyond a "bare bones" narrative and a heavy sprinkling of digital, tabular material in the Annual Report. But the company was much more outspoken at the Annual Meeting on the fourth Thursday of March, at which time shareowners were provided with some glimpses backward into 1943 and also were offered a view into the present and immediate future.

Among the Annual Meeting speakers was Vice President William M. Rand from Merrimac, who uncorked a stunning statistic when he announced, "It is costing Monsanto \$225,000 a year to answer government questionnaires and to fill in federal forms." Bill Rand, still healthy and hearty in retirement at Lincoln, Massachusetts, would no doubt agree that this expense was petty cash compared to the staggering amounts of dollars and manhours spent in subsequent years.

A rather major event involved the acquisition of I. F. Laucks, Inc., Seattle, a customer company which had developed a strong line of plywood glues, along with a wood sealer and primer trade-named Rez and a variety of related products. Laucks would ultimately become the nucleus of what for a brief time Monsanto called its Western Division. Compared to Merrimac, Swann and Fiberloid, Laucks was not a major affair. It commanded 25,000 shares of Monsanto stock, worth \$2 million, in June, 1944. The Rez line was marketed by Monsanto for a short period through paint and hardware stores and ultimately sold to Pittsburgh Paint. Laucks adhesives, involving Monsanto resins, remained profitable but unspectacular. But Laucks did help strengthen Monsanto's market position and identity on the West Coast.

Particularly insofar as Monsanto employees were concerned, the warmest story of 1944 involved a major and long-overdue award for one of the "original Swiss," Gaston F. DuBois, who was presented with the prestigious Perkin Medal by the Society of the Chemical Industry before an audience of 500 industry leaders at the Hotel Commodore in New York. This was a year before his retirement, and those who knew him felt the high honor could not possibly have gone to a more worthy recipient. The "fox terrier of research," who had been one of the founder's early lieutenants, was probably tempted in his acceptance speech to look back upon the day when he arrived in St. Louis, shortly after the turn of the century, and to recall how the city was a maze of telephone poles. He could have recalled the adventures of the early days when John F. Queeny was trying to start a new company with one product. Yet instead medalist DuBois gave a humble address, citing the future opportunities of the chemical industry. Despite his opportunities for nostalgia, he looked in one direction—forward.

Monsanto's principal tie with the old Fiberloid Company, John C. Brooks, general manager of the Plastics Division at Springfield, Massachusetts, had become one of DuBois' firmest admirers—perhaps because DuBois, for his part, had become the self-advertised champion of phenolic resins. A sad event of the year was the sudden and unexpected

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Monsanto had developed

for the Army a lightweight armor material for actual wearing by mili-
tary personnel. It was called Doron and was named for Brigadier Gen-
eral George F. Doriot of the Quartermaster Corps. The product was
made of glass cloth and resin, a forerunner of reinforced plastics typi-
fied by the famous Fiberglas.

War's end also enabled Edgar Queeny to report that Dr. Charles A.
Thomas had led the group of scientists (in 1943 and 1944) who refined
the 94th element, plutonium, preparing the way for the development of
the atom bomb.

This story is best told by a letter written to Edgar Queeny on August
15, 1945, by Major General L. R. Groves of the War Department:

"With the advent of V-J Day and the realization of the United States
and the world that the atomic bomb played a major part in bringing
about peace at an earlier date than could otherwise be expected, I wish
to personally thank you for the work done by Monsanto Chemical
Company.

"A detailed description of your efforts must still remain undisclosed
because of security requirements, but I want you to know that Dr. C. A.
Thomas and his associates made a major contribution to our success.
Dr. Thomas personally coordinated a very important phase of the
chemical research pertaining to the project; he also completed vital
research and solved production problems of extreme complexity without
which the atomic bomb could not have been. . . .

"I also appreciate your taking over the contract for the operation of
Clinton Laboratories (near Oak Ridge, Tenn.). . . . Your recognition of
the need for industrial management of Clinton Laboratories showed
your continued confidence in our prospective success at a time when
success had not yet been achieved or even assured.

"I am sure Monsanto Chemical Company will continue to give aid to
the nation in carrying on future development in the field of atomic
energy."

This was prophetic. Within a few years Monsanto would indeed be
busily engaged in researching peacetime uses of atomic energy as a
contractor for the Atomic Energy Commission at a large installation
called Mound Laboratories at Miamisburg, Ohio.

The message from General Groves was reproduced in *Monsanto Mag-
azine*. In addition, a letter went to all employees saluting them for all
they had done to help their nation during World War II.

No one seemed happier in 1946 than Josiah B. Rutter, Merrimac
alumnus and now director of corporate engineering, when the company
purchased from the government the Texas City styrene plant. Rutter
had been the construction boss when the gleaming towers of Texas City
were installed in seven days less than a year during the pressure-cooker
strain of war's demands. He called the plant his "pride and joy." And
he reveled in the company's postwar plans to expand and modernize, to
add polystyrene molding compound as well as several petroleum-based

intermediates. More than \$140 million was ticketed to be spent for this expansion.

By August of 1946 this transfer—from "Uncle Sam to Uncle Edgar," as the joke went—was effected and things looked bright on the sunny Gulf Coast of Texas.

Things had less of a sheen on the labor front. The Chemical Workers Union (AFL) had demanded a closed shop agreement along with a master contract covering Monsanto's St. Louis area plants. Monsanto said no. As a result, three major locations—the John F. Queeny plant in St. Louis, Plant B near East St. Louis, Illinois, and the plant at Everett, Massachusetts—were struck. For almost four months operations were restricted while 4000 workers stayed away from their jobs. When the strike was settled the union gained a tidy package of benefits—but not a closed shop and not a master contract.

President Rand's sights were high as the company moved ahead into other product expansions and into new markets, at home and abroad. His 1946 comments about exports reflect the surge of the times:

"The world demand for products is in excess of our ability to supply. The rate of our current exports is even greater than that of our lend-lease shipments during the war. We are furnishing supplies to European markets. We have resumed shipments to the Philippines. We are increasing our sales to South America. Our representatives are at work in the Far East, South America and India."

He also mentioned that Monsanto had its own production facilities in England, Canada and Australia.

In London, Edward A. O'Neal, who had gone steadily up the ranks in the Phosphate Division, moved in as managing director of Monsanto Chemicals Limited in 1946. The story is best told by O'Neal:

During the previous year, I had been sent on a special assignment to London to investigate a rumor that the postwar Labour Government in England was considering nationalizing the chemical industry. My most reliable source for checking this out was Lord McGowan of Imperial Chemical Industries, who was high both in industrial and political circles. He assured me there was no such government plan. I reported this to the Monsanto board at its meeting during Christmas Week of 1945.

Then when I was sent to London on a permanent assignment in 1946, employees were just beginning to trickle back from Ruabon, where they had been able to work during the war at their hideaway headquarters, safe from German bombs. MCL had about 50 headquarters employees at the time.

The Ruabon plant very much needed repairs and new processes after the long period of wartime demands in production. The other MCL plant, at Sunderland, on the North Sea, had been demolished by German bombs. Nothing was left but rubble and twisted metal. There was no choice other than to abandon this location.

The job ahead for the British subsidiary was clear—to mold a

stronger cement and room at Vicksburg to build out a bit in the locations, \$1 million.

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stronger company. MCL very much needed an accounting department and an engineering department. But there was insufficient room at Victoria Station House. Granted, we had a long-range plan to build our own office building in the heart of London. But that was a bit in the distance. The only solution was to split up into several locations, awaiting the time we could regroup and occupy our own Monsanto House on Victoria Street near Westminster Abbey.

The overpowering need after the war was plant modernization and maintenance. St. Louis decided we should be responsible for our own financing and encouraged us when we decided to raise \$15 million in sterling by placing a third of MCL's shares on the public market.

In retrospect, this was a master stroke. It made Monsanto more a part of the country at a time when British concern about Britain was very important to the national morale. Our parent was known to be American—and it was up to us in the subsidiary to be a part of the place where we lived. The British public now had a piece of the action. This was all to the good.

Throughout Monsanto, in that upbeat year of 1946, optimism prevailed. Consolidated sales were almost \$100 million and earnings were \$10 million—despite the effects of the four-month strike. Both numbers were all-time records. And capital expenditures were a then-massive \$25 million.

One of the major capital expenditures initiated in 1946 was for a \$3 million production facility at Plant B, for Santomerse, a "soapless soap." This became the company's first major entry into the dawning era of synthetic detergents. Monsanto had been making Santomerse on a small scale at Nitro, West Virginia, and by 1946 was aware that it had a product which could be an important factor in putting an end to the soap rings around the nation's bathtubs.

Two other important new products—both highly innovative—also came onto the scene during 1946. One, like Santomerse, was an entry in the field of detergents. It was called Sterox low-sudsing detergent. The other was Skydrol nonflammable hydraulic fluid for aircraft.

Each was a "specific remedy for a specific ailment." Each was a Monsanto invention.

The Sterox detergent product was still two years away from being manufactured in commercial quantities in Trenton, Michigan. Yet even in its introductory period it was attracting attention. It had been developed at the Central Research Department in Dayton as an outgrowth of research into phosphate builders and surface-active agents and water softeners.

Central Research staffers, working with many varieties of automatic washing machines in the testing of various phosphate-based detergent compounds, had noticed that high-sudsing detergents were somewhat inefficient when used within the confines of certain kinds of automatic washing machines, mainly the so-called front-loading makes.

Westinghouse Electric Corporation deliberately and specifically called to Monsanto's attention the shortcomings of high-sudsing detergents in the front-loading Westinghouse washers and asked Monsanto if it could come up with an efficient detergent which wouldn't create a heavy mass of suds. Voilà—Sterox low-sudsing detergent!

A dilemma.

On the one hand, the Phosphate Division's No. 1 customer was the detergent industry—"the soapers." Companies like Procter & Gamble, Colgate and Lever Brothers were crucial to Monsanto's present and future. These companies were busily and profitably advertising their high-sudsing detergents all over the land, high-sudsing detergents which were doing a heroic job in a wide variety of household and industrial uses, affording a dramatic improvement over the earlier era of soaps made from animal and vegetable fats.

On the other hand, here came Monsanto with a low-sudsing detergent which would work more efficiently in front-loading automatic washing machines with a water level lower than that in top-loaders.

It was a good-news-and-bad-news situation.

Monsanto's technological breakthrough was the good news. But a bit of a customer relations problem began to loom on the horizon, and this of course was the bad news.

What, Monsanto wondered, will the soapers say about low sudsing at the very time they are trumpeting, via millions of dollars' worth of advertising, the virtues of high sudsing?

Procter & Gamble's late-forties advertising campaign for the general purpose household detergent Tide showed how a small amount would fill a railroad boxcar full of suds. Monsanto was totally in cahoots—and ran its own ad captioned "The Day Niagara Falls Flowed Over," an ad that depicted an overpowering cascade of cleansing suds. Monsanto was, after all, a principal supplier for the high-sudsing phenomenon.

The new low-sudsing product thus developed into a mixed blessing for Monsanto, which had traditionally avoided head-on competition with its major customers. After all, the company's slogan was "Serving Industry Which Serves Mankind."

Here was a company which was the world's largest manufacturer of acetylsalicylic acid, selling this product to drug houses, which packaged it by its more popular name, aspirin. But Monsanto would never dare to compete with those drug houses by taking aspirin tablets straight to the corner supermarket. Here was a company making plastic raw materials, but one which would never dare to compete with the manufacturers of plastic countertops, toys, toothbrushes, appliance parts. Here was a company calling itself the world's largest in the mining and general technology of elemental phosphorus, and a company basic in phosphate raw materials, which would never dare to alienate a major segment of its industrial phosphates market, namely: the soapers.

The product called Sterox low-sudsing detergent—later to be chris-

tened "all" detergent in 1946 and marketed out to become, for better or later—in 1952—discussed in detail.

But the low-sudsing detergent was the laboratory. It was also a subject of interest.

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The call to the manufacturer of the world. Monsanto by 1948 Skydrol had not only a two-year research, precisely tailored.

Monsanto's interest. Here Skydrol would onto a surface.

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nt—later to be chris-

tened "all" detergent—brought Monsanto to the crossroads. Introduced in 1946 and manufactured in large quantity a few years later, this turned out to be one of the company's most exciting products and it became, for better or worse, one of the reasons why Monsanto decided later—in 1952—to "go retail." The chain-reacting consequences are discussed in detail in Chapter IX.

But the low-sudsing detergent was not the only big postwar news from the laboratory. Skydrol nonflammable hydraulic fluid for aircraft was also a subject of special attention.

Keeping in mind 1946 was still a bit prior to the jet age, it is useful to remember that in piston-powered aircraft with reciprocating engines, vibration was an omnipresent factor. Hydraulic lines carrying fluid to various parts of the aircraft—for the control of such essentials as flaps and landing gear—were much like the arteries in a human body. Vibration was a constant problem to cope with—vibration which could cause joints in a hydraulic system to rupture, and could result in a leak spraying liquid under pressure—flammable liquid. When such liquid was sprayed onto hot metal, a fire could result. Even sparks could ignite such a liquid.

The need, plainly, was for a nonflammable hydraulic fluid—one which could bring a new measure of safety to aircraft operations, which could remain stable, could withstand pressure, could flow easily, and could provide sufficient lubricity for use within the pumps powering the hydraulic systems.

The call to Monsanto came from Douglas Aircraft Company, manufacturer of commercial and military aircraft operating around the world. Monsanto's research mission was announced early in 1946 and by 1948 Skydrol was available in commercial quantity. Douglas Aircraft had not only sounded the alarm but had cooperated at every inch of the two-year research road. The problem-solving product Skydrol was precisely tailored to fit a need—to do a specific job and to do it effectively.

Monsanto had been saying all along its products were in the public interest. Here was another piece of evidence to back up the claim. Skydrol would not even ignite in manifold tests when it was sprayed onto a surface at 1300 degrees Fahrenheit.

Its use subsequently continued on into the jet age—around the world. Jets would have less vibration but an even greater number of arteries carrying hydraulic fluid through their airframes.

Edgar Queeny was especially proud. An aviation enthusiast and a member of the board of directors of American Airlines, he liked the whole idea of having Monsanto associated with aircraft safety. More than once he pointed to the sky and commented, "You'll find Monsanto up there."

Information on the
use of chemical warfare with
the United States Service Forces
is contained in the Department of Public
Relations, Chemical Warfare Service, Liaison.

Publication date: 17 December 1944

Information Branch, Office Chief Chemical Warfare Service
Washington, D.C.

(53) General Info

Information Branch, Office Chief Chemical Warfare Service,
Point, Washington 25, D. C., Ext. 2429, 25 October 1944

For North American Newspaper Alliance
Chemical Warfare Service

MISSOURI FACT SHEET--I: Contractors

Missouri Firms Making
War Material for CWS

Chemical Warfare Service
Fact Sheet No. 1

Contractor

Item

Cumulative Value
of Contracts

Montanto Chemical Co. Protective Chemicals \$1,095,000
1700 South 2d St.
St. Louis, Mo.

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... uniforms to ...
... of the U. S. ...

Information Branch, Office Chief Chemical Warfare Service, ASF, Gravelly
point, Washington 25, D. C., Ext 2429, 25 October 1944

For North American Newspaper Alliance
Chemical Warfare Service

MISSOURI FACT SHEET—II: Installations

Chemical Warfare Service
Installations in Missouri

JOHN A. HAYES, Major, Chemical Warfare Service

Chemical Warfare Renovation Section of Kansas City Quartermaster Depot:

The C. W. Renovation Section of this depot at Kansas City,
Mo., processes Army uniforms to make them gasproof. Major
— John R. Cooper is commanding officer of the C. W. Section.

(Feature story on this installation is attached.)

Information Branch, Office Chief Chemical Warfare Service, ASP, Gravelly Point, Washington 25, D. C., Ext 2429, 25 October 1944

For North American Newspaper Alliance
Chemical Warfare Service

MISSOURI FACT SHEET: III Decorations

Missouri Men With CWS
Decorated for Valors

RICHARD J. COLLINS, Sergeant, Chemical Warfare Service, 1442 East Prairie St., St. Louis, Mo. — Silver Star

JOHN J. HAYES, Major, Chemical Warfare Service, St. Louis, Mo. — Legion Of Merit

WALTER C. LOZIER, Private First Class, Chemical Warfare Service, Braymer, Mo. — Oak Leaf Cluster

JAMES F. EIDSON, Private First Class, Chemical Warfare Service, Macks Creek, Mo. — Purple Heart

CLARENCE A. CLARK, JR. Private, Chemical Warfare Service, Maryville, Mo. — Purple Heart

FRANCIS J. SCHLEIFER, 1st Lieutenant, 5011 Miami St., St. Louis, Mo. — Silver Star

WILLIAM S. HUTCHINSON, Lt. Colonel, 422 Adams St., Ferguson, Mo. — Silver Star

Information Branch, Office Chief Chemical Warfare Service, ASF,
Gravelly Point, Washington 25, D. C., Ext. 2129, 25 October 1944

For North American Newspaper Alliance
Chemical Warfare Service

MISSOURI

ALLIANCE FACT SHEET--IV: Well-Known Personnel

Well-Known Men in CWB
From Missouri

John
Colonel James C. MacArthur
Chemical Officer, 12th Army Group

Born Jerseyville, Ill.

Note: Prior to last was

reporter for St. Louis Herald-Examiner.

St. Louis Democrat, (Missouri)

and city editor of Omaha Daily

News (Nebraska)

Colonel Geoffrey MacCalli
Commanding Officer
Huntsville Arsenal, Alabama

Born
May St. Louis, Mo.

Brig. Gen. Alexander Wilson
Commanding General
Rocky Mountain Arsenal
Denver, Colorado

Born Farmington, Mo.

Information Branch, Office Chief Chemical Warfare Service, ASF,
Cravell Point, Washington 25, D. C., Ext. 2429 - 25 October 1944.

For North American Newspaper Alliance
Local Feature on Chemical Warfare Service.

MISSOURI PAPERS ONLY

Kansas City Report
Protects U.S. Army's Uniforms

KANSAS CITY, MO.--One good reason American soldiers are well protected against gas warfare is the Chemical Warfare Research Section of the Kansas City Quartermaster Depot.

One of several such plants now in operation, the chemical warfare section turns out gas-proof clothing for the Army. Before the war it was producing 50 percent of the Army's protective clothing.

G.I. uniforms by the bale enter the plant, are dipped in chemical vats, then pass through tumblers and drying machines to emerge at the rate of hundred an hour. Commanded by Major John R. Cooper, three officers and 250 civilian workers maintain constant production on one shift per day. The plant is set up for three-shift operation on short notice in case the enemy initiates gas warfare.

The contents of the chemical vats are one of the best kept secrets in the Army Service Forces. Armed guards patrol the area night and day. Prominent signs warn that it is a "Restricted Area," and there is a wide orange line in front of each entrance at which all persons must halt and show their credentials. Until recently, even the workers didn't know what they were producing. Many thought they were delousing Army uniforms.

The special chemical which makes G.I. clothing gas resistant was devel-

oped by the Chemical Warfare Service before Pearl Harbor. All types of clothing, from underwear to gloves, can be treated by the process.

Finding the correct formula, according to Major Cooper, was tedious problem. "It had to stand is undering," he said, "could not cause deterioration nor injure the wearer's skin."

It is estimated that even if the enemy were able to secure a sample of the mixture, it would take him many months to find out the formula, years to get it into quantity production.

The Chemical Warfare Research Section, which is supervised by the Industrial Division, Office of the Chief of the Chemical Warfare Service, Washington, has been in operation since early 1942.

The knowledge that the plant, and others like it, exist serve as a deterrent to discourage any enemy intentions to use gas in the future.

Monsanto Chemical Works

MONSANTO CHEMICAL WORKS, which gives its name to Monsanto, Illinois, was founded in 1901 by Mr. John F. Queeny, now Chairman of its Board. At the time of its origin, the chemical industry of America was in its infancy. That it has since attained its present proportions has been in no small degree due to just such far-sightedness, courage and tenacity as has marked the growth of Monsanto Chemical Works.

European manufacturers for years held the main sources of supply on almost all of the chemicals required in the United States. The path of the present-day American Chemical Industry was not an easy one. Many were the difficulties that stood in the way of its progress. Countless obstacles arose to delay its successful establishment.

Monsanto persisted: first, in the production of fine and medicinal chemicals and, later, in the manufacture of heavy and technical chemicals and intermediates. Today the Monsanto Chemical Works ranks as one of the largest producers of chemicals, with a market for its products throughout the entire globe. In its three great plants in St. Louis, Missouri; Monsanto, Illinois, and Ruabon, North Wales, it manufactures

a total of 121 different chemical products required in medical, scientific and industrial use.

That Monsanto has achieved such growth, despite intense competition, in the short span of 28 years has, in large measure, been due to the strategic location of its plants in the Greater St. Louis District. In 1917 Monsanto Chemical Works built its Heavy Acid and Intermediate Plant at Monsanto, Illinois. At that time the executives of the Company looked ahead to the formation of a community of chemical-using industries on that site. To that end they purchased much larger acreage than their own plants called for, with a view of reserving the remainder for other allied industries. All improvements, such as hard roads, lighted streets, sewers, etc., were made.

Ample choice acreage remains. Some of it is owned by others besides Monsanto. Hundreds of acres of level, well drained land are available. These sites Monsanto Chemical Works now offers to manufacturers seeking profitable expansion. Monsanto's object is to attract desirable industries, particularly those requiring chemicals.



*from Monsanto, Ill guide book
for plant expansion
(revised)*

Chemicals in Quantities Available to Industries Located in Monsanto

THE tremendous advantage of being able to buy heavy and technical chemicals and intermediates right at their doors will be readily appreciated by those industries in whose processes

these play an important part. Following is a list of such chemicals, manufactured in quantities by the Monsanto Chemical Works at their Monsanto plant.

Heavy and Technical Chemicals

Caustic Soda	Nitric Acid
Chlorine	Oleum
Chlorsulfonic Acid	Salt Cake
Electrolyte (Battery Acid)	Sodium Sulfate
Mixed Acid (Nitrating)	Sulphuric Acid
Muriatic Acid	Sulphur Chloride
Nitre Cake	Zinc Chloride

Intermediates

Monochlorbenzene	Paranitrophenol
Monsanto Salt (Orthochlorparatoluene-Sodium Sulfonate)	Paranitrophenol Sodium
Orthene (Orthodichlorbenzene)	Paraphenetidin
Orthochloraniline	Paratoluenesulfonamid
Orthonitraniline	Paratoluenesulfonchloride
Orthonitrochlorbenzene	Phenol
Orthophenetidin	Phthalic Anhydride Flakes
Paradichlorbenzene (Santochlor)	Salicylic Acid Technical
Paranitraniline	Sodium Acetate
Paranitrochlorbenzene	Sodium Phenate

Fine and Medicinal Chemicals

In its St. Louis plant, directly across the Mississippi River from Monsanto, Illinois, the Monsanto Chemical Works manufactures a complete line of Fine and Medicinal Chemicals.